

**REMARKS**

Claims 2-10, 20, 21, 36-39 and 46-50 are pending in the application. Claims 2-10, 20, 21, 36-39 and 46-50 are rejected. No claims are allowed.

Claims 36, 49 and 50 have been amended to more clearly describe and distinctly claim the subject matter Applicants consider their invention. Specifically, claim 36 has been amended to positively recite that the catalyst member has been placed within a bend or curve within an exhaust manifold or exhaust flow pipe. Claims 49 and 50 have been amended to reflect the change made to claim 36. Support for the amendment can be found throughout the specification and figures as originally filed, *e.g.*, pages 18, 34, 35, 40, 41; Figures 7A-C. Accordingly, no new matter has been introduced by this amendment.

Reconsideration of the claim rejections and allowance of the pending claims in view of the amendments above and following remarks are respectfully requested.

**Claim Rejections – 35 U.S.C. § 112**

Applicants acknowledge with appreciation the Examiner's withdrawal of the rejection of claims 2-10, 20, 21, 36-39 and 46-50 under 35 U.S.C. 112, first paragraph, as indicated in the Advisory Action mailed on March 13, 2009.

**Claim Rejections – 35 U.S.C. § 103**

a. Claims 2-5, 7-10, 21 and 36-39 are rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Gorynin et al. (US 5,204,302; "Gorynin") in view of Rondeau (US 4,027,367; "Rondeau"), optionally further in view of Ishida (US 4,455,281; "Ishida") and Uchida et al. (EP 0831211; "Uchida"). The Examiner states that Gorynin discloses "corrugating" and "rolling" a catalyst strip into a cylinder, which is considered

the same as "bending," and the cylinder is considered as having a "curve" because the cross-section of the cylinder is a circle. Optionally, the Examiner states that Figures 16A-16B of Uchida can be applied to show exhaust catalysts positioned in the conventionally known curved part of the exhaust pipe 5. Uchida is also applied to show that it was known in the art to deposit catalyst-bearing layers 102 on the inner and outer surface of a porous internal pipe 101, which can be conformed to exhaust pipe 100 (note Figures 17-18).

In response to Applicants' arguments submitted on September 22, 2008, that the claims require that the bend or curve be within an exhaust manifold or exhaust flow pipe, not the cross-section of the catalyst member, the Examiner states that the claims only require is that the catalyst member "conform" to a bend or curve in an exhaust manifold or exhaust flow pipe, not that there positively be a bend or curve in an exhaust manifold or exhaust flow pipe during operation of the claimed method.

In the interest of further distinguishing Gorynin, claim 36 has been amended to positively recite that the catalyst member has been placed within a bend or curve within an exhaust manifold or exhaust flow pipe for operation of the claimed method. Now it is completely irrelevant whether, as the Examiner asserts, the cylinder in Gorynin is considered as having a "curve" because the cross-section of the cylinder is circular. As noted at ¶ 12 of the Declaration Under 37 C.F.R. § 1.132 of Michael P. Galligan submitted on November 26, 2007 ("the first Galligan Declaration"), Gorynin does not teach or suggest that the rolled catalytic cylinder is bendable to conform to a bend or curve *within an exhaust manifold or exhaust flow pipe*. This failure to teach or suggest

the claim limitation is enough to defeat a *prima facie* case of obviousness. *See In re Royka*, 490 F.2d 981, 985 (CCPA 1974).

Furthermore, even if the rolled cylinder in Gorynin could be conformed to a bend or curve within an exhaust manifold or exhaust flow pipe (which Applicants dispute), the Examiner has pointed to nothing that would have suggested to one of skill in the art the desirability of placing the rolled cylinder in a bend or curve within an exhaust manifold or exhaust flow pipe during engine operation, or that the catalytic coating would remain intact during engine operation. *See In re Dow Chem., Co.*, 837 F.2d 469, 473, 5 USPQ2d 1529, 1531 (Fed.Cir.1988) ("Both the suggestion and the expectation of success must be founded in the prior art, not in the applicant's disclosure."). "The mere fact that the prior art can be modified does not make the modification obvious unless the prior art suggests the desirability of the modification." *Cordis Corp. v. Medtronic Ave, Inc.*, 511 F.3d 1157, 1172 (Fed. Cir. 2008) (emphasis added). It is only Applicants who recognized that the strong bond of an anchor layer achieved by electric arc spraying permits catalytic substrates to be reshaped and placed in close-coupled positions (e.g., bends and curves) for exhaust treatment (as specifically recited in claims 49 and 50), where prior art catalyst members would not be have been placed due to concern that the intense heat and vibration from the engine would cause physical failure of the catalyst member. *See* page 35. Indeed, as noted at page 1 of Exhibit A to the first Galligan Declaration, the ability to conform to the bends and curves close to the engine allows for more rapid lightoff and improved catalytic oxidation compared to catalysts placed in traditional locations. Such an improvement in catalytic function is not taught or suggested by Gorynin.

Nor does Uchida suggest placing a catalyst member in a bend or curve within an exhaust manifold or exhaust flow pipe during engine operation, or that the catalytic coating would remain intact during operation. Contrary to the Examiner's assertion, Figures 16A and B of EP '211 do not suggest to one skilled in the art that exhaust purifier 50 can be shaped to fit into a bent portion of an exhaust pipe. As noted at ¶¶ 17-18 of the Declaration Under 37 C.F.R. § 1.132 of Michael P. Galligan submitted on September 22, 2008 ("the first Galligan Declaration"), although 61 and 63 contain curved portions, none of the exhaust purifiers are positioned in the curved portions. Rather, they are all placed in the linear regions of the apparatuses due to the fact that they are not conformable or bendable. Purifier 50 in Figure 16A, which the Examiner asserts is bent to conform to a bend in the exhaust pipe, is the same as the purifier shown in Figure 12 of Uchida (*see* col. 13, lines 12-19), which is shown as a straight unit containing a straight plate. Thus, as with Gorynin, Uchida does not teach or suggest conforming a catalyst member to a bend or curve within an exhaust manifold or exhaust flow pipe placement, or placement of the catalyst member within the bend or curve during engine operation. *See Royka*, 490 F.2d 981 at 985.

Accordingly, Applicants maintain that the Examiner has failed to make out a *prima facie* case of obviousness of claims 2-10, 20, 21, 36-39 and 46-50 over the cited references. Applicants also maintain that any evidence of obviousness has been successfully rebutted by the data submitted in paragraphs 5-10 and Exhibit A of the first Galligan Declaration. As discussed in Applicants' previous submission, these portions of the first Galligan Declaration describe the results of testing of a conformable catalyst member compared to a rigid catalyst member of the type described in Gorynin and

Uchida. In each test, the conformable catalyst member exhibited unexpectedly superior results compared to the rigid catalyst member. For example, a 19-mm conformable catalyst member (designated Flextube™) unexpectedly had hydrocarbon conversions from 5% to 15% greater, and CO conversions between 0% and 15% greater, than those of a 21-mm rigid tube in a bench engine evaluation. A 24-mm Flextube™ unexpectedly had hydrocarbon conversions from 5% to 20% greater, and CO conversions between 10% and 20% greater, than those of a 27-mm rigid tube in a bench engine evaluation.

In another set of experiments, a 19-mm OD x 260-mm L Flextube™ and a 21-mm OD x 260-mm L rigid tube were both catalyzed with 20/1 Pt/Rh. The Flextube™ was tested in a close-coupled position in an actual motorcycle engine test, with the inlet located 50 mm downstream of the engine exhaust port. Both the Flextube™ and the rigid tube were tested at a location where the inlet was 300 mm downstream of the engine exhaust port. The results for the conformable catalyst member were unexpectedly good, as the close-coupled Flextube™ achieved twice the hydrocarbon conversion and 50% more CO conversion as the rigid tube located 300 mm downstream. When the Flextube™ was moved from 300 mm downstream to 50 mm downstream, the HC conversion increased from 63% to 81%, and the CO conversion increased from 47% to 62%.

According to the Examiner, the results described in the first Galligan Declaration were not found persuasive because the claimed invention was not compared to the closest prior art, namely the rolled catalytic cylinder in Gorynin. The Examiner states that there is no evidence to show that the rigid tube tested in the first Galligan Declaration is the

same or similar to the catalyst disclosed in Gorynin, which can be corrugated and rolled, and hence not rigid.

First, Applicants note that there is no requirement that the claimed invention be compared to the prior art identified by the Examiner as "closest." Applicants are permitted, and actually required, to compare the claimed invention to art that is closer than what the Examiner identifies. *See In re Holladay*, 584 F.2d 384, 386-87 (CCPA 1978). Here, the claims are directed to a method for treating exhaust from an internal combustion engine comprising, *inter alia*, contacting the exhaust with a conformable catalyst member **placed within a bend or curve within an exhaust manifold or exhaust flow pipe**. Since neither Gorynin nor Uchida discloses a catalyst member placed within a bend or curve within an exhaust manifold or exhaust flow pipe, Applicants maintain that placement of the rigid catalyst tube in a linear portion of the exhaust pipe was an appropriate comparison for the testing described in the first Galligan Declaration.

Second, Applicants submit that even if Gorynin is correctly considered the closest prior art, the rigid tube used for comparison in the first Galligan Declaration was similar enough to the rolled tube in Gorynin to support a conclusion of unexpected results. Figures 1 and 10 Exhibit A of the first Galligan Declaration clearly show that the comparative rigid tube is corrugated and rolled, just as the catalyst in Gorynin is alleged to be by the Examiner. The placement of the comparative catalyst member in the linear portion of the exhaust pipe is consistent with its inability to be conformed to fit within the curved portions of the pipe. Forcing Applicants to somehow convert the rolled catalyst of Gorynin into a flexible tube capable of being placed in the bent portion of the exhaust pipe for the purposes of comparative testing would lead to the absurd result of "requiring

comparison of the results of the invention with the results of the invention." *See In re Chapman*, 357 F.2d 418, 422 (CCPA 1966).

As such, Applicants maintain that the results described in the first Galligan Declaration are unexpected and commensurate in scope with the claimed invention and must be considered when assessing patentability. *See In re Soni*, 54 F.3d 746, 750 (Fed Cir 1995) ("Consistent with the rule that all evidence of nonobviousness must be considered when assessing patentability, the PTO must consider comparative data in the specification in determining whether the claimed invention provides unexpected results."). Such results clearly demonstrate that the claimed method provides unexpected results of exhaust treatment compared to the art of record.

Accordingly, Applicants maintain that claims 2-5, 7-10, 21 and 36-39 are patentable over the references relied on by the Examiner, and withdrawal of the rejection is respectfully requested.

b. Claims 2-10, 21, 22, 36-39 and 46-50 are rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Gorynin in view of Rondeau and Ernest et al. (US 4,451,441; "Ernest"), optionally further in view of Ishida and Uchida. The Examiner acknowledges that Gorynin does not disclose a substrate with at least two regions of substrate densities, but states that Ernst discloses a method for removing carbon and lead particle from exhaust gases by passing the gasses through a coarse filter followed by a fine filter, each with different catalytic loadings. According to the Examiner, it would have been obvious to use substrates with different densities and different catalytic loadings as taught by Ernst in the process of Gorynin because it would promote removal of carbon and lead.

Applicants respectfully traverse this basis for rejection.

Claims 2-10, 21, 22, 37-39 and 46-50 each depend directly or indirectly from claim 36. Where, as here, an independent claim is valid over cited art, *a fortiori* any claim dependent therefrom must also be valid over the same art. *See Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1576 n.36 (Fed. Cir. 1987). As discussed above with respect to the rejection of claim 36, there is no teaching or suggestion in Gorynin or Uchida of a catalyst member that can conform to the bend or curve within an exhaust manifold or exhaust flow pipe placement, or placement of the catalyst member within the bend or curve during engine operation. Furthermore, the Examiner has failed to point to anything Ernst that remedies the deficiencies of Ishida and Uchida in this respect. As such, the cited references cannot render the claimed invention obvious. *See In re Rijckaert*, 9 F.3d 1531, 1533 (Fed Cir. 1993).

Accordingly, Applicants maintain that claims 2-10, 21, 22, 36-39 and 46-50 are patentable over the references relied on by the Examiner, and withdrawal of the rejection is respectfully requested.

c. Claims 2, 6-11, 20, 21, 36-39 and 46-50 are rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Ernest in view of Ishida, optionally further in view of Uchida. The Examiner acknowledges that Ernest does not disclose an anchor layer, but states that Ishida discloses a process for producing a NO<sub>x</sub> catalyst wherein molten metal is sprayed on a metal substrate, followed by deposition of a catalytic material. According to the Examiner, it would have been obvious to use an anchor layer as taught by Ishida in the process of Ernest because it would prevent the catalytic material from falling off.



Applicants respectfully traverse this basis for rejection.

Claims 2, 6-11, 20, 21, 37-39 and 46-50 each depend directly or indirectly from claim 36. Where, as here, an independent claim is valid over cited art, *a fortiori* any claim dependent therefrom must also be valid over the same art. *See Panduit*, 810 F.2d at 1576 n.36. As discussed above with respect to the rejection of claim 36, there is no teaching or suggestion in Uchida of a catalyst member that can conform to the bend or curve within an exhaust manifold or exhaust flow pipe placement, or placement of the catalyst member within the bend or curve during engine operation. Furthermore, the Examiner has failed to point to anything Ernst or Ishida that remedies the deficiencies of Uchida in this respect. As such, the cited references cannot render the claimed invention obvious. *See In re Rijckaert*, 9 F.3d 1531, 1533 (Fed Cir. 1993).

Accordingly, Applicants maintain that claims 2, 6-11, 20, 21, 36-39 and 46-50 are patentable over the references relied on by the Examiner, and withdrawal of the rejection is respectfully requested.

d. Claims 3-5 are rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Ernest and Ishida, optionally further in view of Uchida, and further in view of Donomoto et al. (US 4,798,770; "Donomoto") or Draghi et al. (US 6,042,870; "Draghi"). The Examiner acknowledges that Ishida does not disclose an anchor layer comprising nickel and aluminum, but states that Donomoto discloses that alloys, including Ni-Cr, Ni-Al, Ni-Cr-Al and Ni-Cr-Al-Y, are heat and corrosion resistant, or alternatively, Draghi discloses that MCrAlY, where M is nickel and/or cobalt, has corrosion and heat resistant properties. Thus, according to the Examiner, it would have been obvious to use any of

the alloys suggested by Donomoto or Draghi for the catalyst in Ishida because heat and corrosion resistance is desired in Ishida.

Applicants respectfully traverse this basis for rejection.

Claims 3-5 each depend directly or indirectly from claim 36. Where, as here, an independent claim is valid over cited art, *a fortiori* any claim dependent therefrom must also be valid over the same art. *See Panduit*, 810 F.2d at 1576 n.36. As discussed above with respect to the rejection of claim 36, there is no teaching or suggestion in Uchida of a catalyst member that can conform to the bend or curve within an exhaust manifold or exhaust flow pipe placement, or placement of the catalyst member within the bend or curve during engine operation. Furthermore, the Examiner has failed to point to anything Ernst, Ishida, Donomoto or Draghi that remedies the deficiencies of Uchida in this respect. As such, the cited references cannot render the claimed invention obvious. *See Rijckaert*, 9 F.3d at 1533.

Accordingly, Applicants maintain that claims 3-5 are patentable over the references relied on by the Examiner, and withdrawal of the rejection is respectfully requested.

**CONCLUSION**

It is believed that claims 2-10, 20, 21, 36-39 and 46-50 are now in condition for allowance, early notice of which would be appreciated. No fees other than for the Request for Continued Examination are believed due. If any additional fees are due, however, the Commissioner is authorized to charge any such fee to our Deposit Account No. 503329. Please contact the undersigned if any further issues remain to be addressed in connection with this submission.

Respectfully submitted,

By: /Scott S. Servilla, Reg. #40806/  
Scott S. Servilla  
Reg. No. 40,806  
Attorney for Applicants  
(732) 815-0404

BASF Catalysts LLC  
100 Campus Drive  
Florham Park, New Jersey 07932

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